MESSRS. BURROUGHS, WELLCOME AND CO. have issued an interesting and well-produced guide, with descriptive catalogue, of their exhibits at the Franco-British Exhibition; also pamphlets describing their laboratories, and the research work that has been carried out in them.

THE *Philippine Journal of Science* for April (iii., No. 2) contains a number of important papers relating to medical science—on cholera, on typhus fever, on the virus of cattle plague, and on the venom of the "habu," a venomous snake found in some of the Japanese Islands.

IN No. 33 of the Scientific Memoirs of the Government of India Colonel Bannerman discusses the production of alkali in broth culture media by the plague bacillus, which may reach an amount equivalent to 1·5 per cent. to 2·5 per cent. of normal sodium hydroxide.

OUR ASTRONOMICAL COLUMN.

ANOTHER LARGE SUN-SPOT GROUP.—The renewal of the sun-spot activity illustrated in these columns last week is being well maintained. On Wednesday, August 12, the large groups shown on our photograph had reached the western limb of the sun's disc, and on Thursday bad weather prevented observations entirely at South Kensington; but on Friday morning it was seen that a large scattered group of small spots had broken out near the centre of the disc, whilst numerous small spots were scattered over the surface. This new group was visible to the naked eye, and has apparently evolved from a prominent group of faculæ which was observed near the eastern limb earlier in the week.

THE TOTAL SOLAR ECLIPSE OF DECEMBER 22–23.—Further particulars concerning the possibility of observing the total eclipse of the sun in the Antarctic, in December next, are contained in a letter we have received from Prof. Wilhelm Krebs.

Prof. Krebs points out that both Bouvet Island and the more northerly Thompson Island lie outside the real ice limits, and that only small, isolated icebergs were observed by the expedition ships that have recorded them. Thus, with a totality lasting, according to his calculations, 11·3 seconds, it might be possible to secure pictures of the corona at Bouvet, or Thompson, Island in December. Meteorological and magnetic observations could be carried out, as also could observations of the shadow bands and of the radiation variations. The approximate times of mid-eclipse in different longitudes are shown below:—

Longitude ...	W. 60°	40°	20°	0°	20°	40°	60° E.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
G.M.T. Dec. 22–23...	22 15	22 37	23 11	23 45	0 15	0 43	1 6

ONE HUNDRED NEW DOUBLE STARS.—Prof. R. G. Aitken's twelfth list of double stars is published in No. 134 of the Lick Observatory Bulletins, and brings the total number now discovered up to 1800. All the double stars in this list were discovered and measured with the 36-inch refractor, and attention is directed to Nos. 1745, 1746, and 1777, which add closer companions to OΣ 190, Σ 1224, and Σ 1579 respectively.

THE NIGHT-GLOWS AT THE BEGINNING OF JULY.—In No. 4266 of the *Astronomische Nachrichten* (p. 297, August 1) Prof. Max Wolf discusses the night-glows which attracted so much attention about July 1. On that date Prof. Wolf was unable to carry out his usual programme of photography because the sky-glare was far too bright, and in the north only such stars as Capella and α and β Ursæ Majoris were easily visible to the naked eye. At first Prof. Wolf suspected that a display of aurora was taking place, but failure to observe the aurora spectrum or any fluctuations of the light led him to conclude that the phenomenon was due to the peculiar high cirrus cloud that prevailed.

THE EMPLOYMENT OF SELENIUM CELLS IN PHOTOMETRY.—Readers of these columns will remember that some time ago Messrs. Stebbins and Brown, of the Illinois University Observatory, made photometric observations of the moon's light, using selenium cells (see NATURE, January 16 and 30, pp. 258 and 302), and subsequently showed that the great differences found were due to the different colour-sensibilities of these cells (NATURE, May 7, p. 18). Referring to these observations in No. 1, vol. xxviii., of the *Astrophysical Journal* (p. 83, July), Prof. Pfund points out that the curves determined by Mr. Stebbins are not true sensibility curves, because the energy curve of the spectrum employed was not taken into account. He also suggests that, at the present time, the use of selenium cells is unwarranted except in observations of the variations of a light source of which the effective area alone changes. A method of employing selenium cells in combination with colour screens for the determination of stellar magnitudes has been devised by Prof. Pfund, and will be fully discussed in a future publication.

ECLIPSES OF SATURN'S SATELLITES.—During the coming opposition of Saturn, Rhea and the inner satellites will be eclipsed. The following times of eclipse are taken from a paper published by Dr. H. Struve in No. 120 of the Publications of the Astronomical Society of the Pacific:—

	Disappearance			Reappearance		
	h. m.	″	°	h. m.	″	°
August 22 ...	13 6 ...	4·3 ...	218	14 15 ...	2·1 ...	193
,, 31 ...	14 11 ...	3·0 ...	211	14 59 ...	1·8 ...	193

The distances are measured from the planet's limb, and the position-angle from the N. point of the minor axis towards E. (the *Observatory*, No. 399, p. 326, August).

A LARGE PROMINENCE.—In No. 1, vol. xxviii., of the *Astrophysical Journal* (July, p. 79), Mr. Evershed describes a large prominence of which a series of photographs was obtained with the Kodaikánal spectroheliograph on February 18. The first plate was secured at 8h. 23m. (Indian Standard Time), and showed no unusual disturbance, but a supplementary photograph at 9h. 38m. showed that a prominence faintly showing on the first plate had developed enormously, the disturbed area extending from position-angle 89° to 127°. Visual observations showed prominence matter on Hα, and the sodium and magnesium lines were also observed bright within the affected region. Twenty "limb" spectroheliograms were obtained during the day, the last being taken at 18h. 2m., when the sun was less than 3° above the horizon, and, of these, fourteen are reproduced. These show that the increase in size took place quite gradually, and that the velocity with which the great mass left the sun was, after the first outburst, consistently accelerating. The main mass of matter was joined to the sun by a fine filament, situated at the edge of the disturbed area, which appeared to act as a flexible cord holding one end of the mass to the sun and forcing it to swing out in a curve. The greatest height shown on the photographs was 585 seconds of arc, or more than 260,000 miles.

THE WATER OF THE METROPOLIS.

THE report of the Water Examination Committee (July 18, 1908), and the first report on research work by Dr. Houston, the director of water examinations, Metropolitan Water Board, contain matter of considerable interest. The first details the results of the chemical and bacteriological examinations, many hundred in number, of the raw water and of the filtered supplies delivered to the consumers within the area of the Water Board for the year ending March 31, 1908. The matter is arranged in tabular form, and, *inter alia*, much information is given respecting the distribution and types of *Bacillus coli*, the effects of subsidence and filtration on the bacterial content of the water, and the composition of the media employed in bacteriological research in the Board's laboratories.

Dr. Houston's report deals with the important question of the vitality of the typhoid bacillus in artificially infected samples of raw Thames, Lee, and New River water, with

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special reference to the question of storage. Full details are given of the experimental methods employed. Taking cultures of 100 cubic centimetres of water as the final guide, it appears that, starting with an initial number of typhoid bacilli varying from 40 per c.c. to 8,000,000 per c.c. in the infected water, the typhoid bacillus could not be recovered from 100 c.c. of the water in any of the eighteen experiments after nine weeks, *i.e.* in this period the organism had died out so far as experiment could ascertain, and in sixteen out of the eighteen experiments the organism had died out in eight weeks. If, therefore, the water before distribution to the consumer could be stored for an adequate period, it would seem that the risk of conveyance of typhoid, supposing the water were infected, would be practically eliminated.

At present the Water Board's existing storage reservoirs are capable of holding in the aggregate 8883·7 million gallons, which is forty times the average daily supply of 219 million gallons, and powers have been obtained for the construction of storage reservoirs for another 6000 million gallons. When these are completed, the storage capacity would be adequate for the storage of the water for the eight or nine weeks necessary to eliminate the typhoid bacillus. Even in existing circumstances the conditions are by no means unsatisfactory. Unfortunately, however, the storage capacity at the different works is very unequal, and some have to take their water after only a limited period of storage. If the different reservoirs could be connected, and the supplies so "pooled," a better condition of things would result. Adequate storage of water also presents advantages of a general character, apart from the elimination of typhoid, *e.g.* subsidence of particulate matter which tends to block the filter-beds, reduction in the total bacterial content, &c.

R. T. H.

SOME RESULTS OF THE NORWEGIAN HERRING INVESTIGATIONS.

"UNSERE Heringsstämme und ihre Wanderungen" is the title of a paper written for the Bergens Museum Aarbog, 1908, by Hjalmar Broch, dealing with some of the results of the Norwegian investigations into the herring fisheries. Extensive and detailed observations made by the *Michael Sars*, the Norwegian vessel for the international investigations, supplemented by information from other vessels, have yielded some valuable and interesting information as to this fish. One of the chief objects in view was to distinguish clearly the different races or varieties of herrings that are to be found in the North Sea, for it has of late been becoming more and more evident that each race of herring must be studied by itself, the characteristics and the direction and extent of the wanderings of the different shoals being very different. Following the method used by Heincke to accomplish this object, Broch has made a series of biometrical observations on numerous fish, and so determined their differences of structure, and these, accompanied by observations on sex, maturity, and fatness, have added considerably to our previous knowledge of the subject. Tables of the measurements are given, and the differences between the corresponding average measures on fish from different races, with their probable errors, are printed in the text, so that we are able at a glance to estimate the real significance of these differences. The inclusion of these in this form is of real value. For example, the differences between the averages of most races are considerably greater than their probable differences, but there is no conclusive proof as yet whether or not the varieties known as spring and large herring are really of the same race.

The following kinds of herring and their characteristics are now well known:—

(1) The Dogger Bank herring in the central North Sea.
(2) The Bohusläns herring in the Skager Rak.
(3) The Shetland herring in the northerly and westerly parts of the North Sea.
(4) The Norwegian spring and large herring along the Norwegian west coast and the north-easterly part of the North Sea.
(5) The Beitstad Fiord herring in Trondhjems Fiord.

There is a short section on the age investigations, which are as yet not advanced enough to give many results. Age is determined by means of the annual rings in the herring scales. An examination of plate ii. shows that the length of a herring is not by any means a simple function of its age, the growth rate being very different for the several kinds. The Beitstad Fiord herring, which is supposed to spend its whole life within the area of the fiord, is found to grow much more slowly than those races which frequent the open sea. In its fifth year it seldom exceeds a length of 22 cm., whilst the herrings of the Norwegian seas may become 24 or 25 cm. even in their second year.

The distribution of the various shoals and their movements at different times of the year have been studied. For instance, the spawning-places of the spring and large herring are found along the Norwegian coasts from Trondhjems Fiord to Risør, and the shoals gather here in early spring. The spent herrings then move into the open sea, and later in June they appear on the North Sea slopes. In autumn, 1905, they were discovered on the coastal banks between Stadt and Lofoten, whence in December they moved in a southerly direction towards the spawning-places along the coast.

The value of these investigations is not for the man of science alone; they are of great importance to the practical fisherman, who, knowing exactly when and where the various shoals spawn, is able to catch the herring when they are prime and avoid them in their spent condition. Many interesting questions, such as the relation of the herring migrations to the distribution of plankton, yet remain to be solved, and these must be the object of further investigations.

R. M. L.

ARCHÆOLOGICAL RESEARCH IN INDIA.

A WRITER who has enjoyed unusually favourable opportunities of examining the conditions under which archæological research in India is being conducted has recently contributed to the *Times* a series of reports of his observations. Archæology in India is now at last, after a period of vandalism and neglect, being conducted on business and scientific principles. For this we are indebted to Lord Curzon.

The first serious attempt to collect information dates from the appointment, in 1862, of General Cunningham as Director of Archæology. Owing to the wide extent of the sphere of operations and the difficulty of securing the services of qualified assistants, the result was far from satisfactory. A long series of reports was issued, which, though they contain some valuable material, are ill-arranged and overloaded with useless matter. Besides this, under the régime of General Cunningham the work of conservation of existing buildings formed no part of the proceedings undertaken by the Government of India. After the retirement of General Cunningham little progress was made until, under Lord Curzon's scheme, in 1901 the post of Director was conferred upon Mr. J. H. Marshall, who, though without any Indian experience, had been trained in the Cambridge School of Greek Archæology. Since his appointment the work of conservation has gone on side by side with that of exploration, and important buildings like the Taj Mahal at Agra and the palaces at Fatehpur-Sikri have been judiciously restored. The most noteworthy excavations now in progress are those at the Buddhist monastery at Sarnath, near Benares, the buried city of Sravasti in northern Oudh, and the Græco-Buddhist remains in the neighbourhood of Peshawar. On the results of these excavations excellent periodical reports have been issued.

It is hardly realised what a wealth of archæological material still remains to be explored. Kapilavastu, the birthplace of Buddha, which lies just within the Nepalese Terai; Pataliputra, the Maurya capital, in the neighbourhood of the modern Patna; and numerous sites of the first importance in the Punjab and the United Provinces of Agra and Oudh, such as Taxila, near Rawalpindi, still await exploration. Research at many of these sites is certain to unearth inscriptions and sculptures which will

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